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steamboat, and at Omsk took a west-bound express on the Siberian railway; and so entered Europe early in August. It may be noted in closing that Mr. Pumpelly is now—March, 1904—again in Turkestan, where he is continuing his studies under the most favourable conditions.

THE ANNUAL REPORT OF THE COAST AND GEODETIC SURVEY FOR 1903.

Aside from its scientific interest as a record of progress in geodetic and terrestrial magnetic measurements, the present Report contains a large volume of results of the highest economic value. The precise levelling operations that have been carried on by this Survey and their interlocking connections with the similar measurements that have been executed by the Geological Survey, the survey of the Northern and Northwestern Lakes, the Mississippi River Commission, the army engineers, the great railroad corporations, and by the State of New York in connection with the contemplated improvement for water-borne traffic between New York Harbour and the Great Lakes are scientifically discussed and summarized in an extensive and valuable report, which has an intimate bearing upon the industrial development of the country.

A large amount of progress was made at an unusually rapid rate in the extension, from Kansas to the Rio Grande, of the primary triangulation for the measurement of the arc of the 98th meridian in its extent throughout the United States. Beyond the interest attached to the extension of this system of precise triangulation as a contribution to the more perfect discussion of the size and shape of the earth is its immediate usefulness in providing reliable points of reference for the more detailed geographical surveys that are continually being carried forward by private and Government organizations.

The Coast and Geodetic Survey has been for some years carrying forward a magnetic survey of the United States under very able administration, and much practical good has already been done in the establishment of meridian lines for the use of surveyors in every part of the country, and in forestalling litigation and in paving the way for the orderly conduct of isolated compass surveys. Fixed magnetic observatories have been established in different sections of the United States and in the outlying dependencies, where a continuous registry is made of the variations in the values of the declination and inclination, and of the intensity of the earth's magnetic force; and the foundation has been laid for the collection of a vast store of observational data, which, when studied in connection with the investigations of geologists and astronomers, promise to lead to important advancements. The Report contains a map showing the magnetic observation stations that were occupied up to 1903 in the United States, and gives an exposition of the observations that were made from July 1, 1902, to June 30, 1903. The Report also indicates that extensive part was taken by this organization in locating both international and interstate boundaries.

Turning from these extensive and important activities in the interior of the country to the harbours of the seaboard and the extensive coastal waters through which so much of the world's commerce approaches our shores, it is seen that the Survey was active during 1903, with twelve surveying vessels and a large number of skilled men in the prosecution of marine hydrographic operations, for the production of charts and sailing directions, for the benefit of commerce and navigation and the safeguarding of the lives of seamen. These operations, excepting the preparation of coast pilots, were not prosecuted extensively on the coasts of the United States, because our Atlantic, Gulf, and Pacific coasts have been almost completely surveyed, and the resulting charts can be kept correct for the use of mariners by the incorporation of the results of harbour surveys made by the army engineers, and with isolated surveys here and there in localities where change or development has rendered resurveying necessary; but in the coastal waters of the Philippines, of Alaska, and of Porto Rico a great deal was accomplished in charting what was before unknown.

The coasts and harbours of Porto Rico, one of the oldest colonies in the Western Hemisphere, were very inadequately known in 1899. They have now, for the most part, been fully surveyed and charted for purposes of navigation. In the Philippines, in addition to a large extent of littoral triangulation in Luzon and the exact determination of the geographical positions of many important points and places in Luzon and other islands, San Bernardino Strait, the most important gateway leading into the archipelago from the Pacific Ocean, and other neighbouring parts concerning which the need of marine hydrographic information was much felt, were surveyed and fully charted to the satisfaction of navigators.

The most important step that was taken with reference to the survey of the Hawaiian Islands consisted in the determination of the longitude of Honolulu with reference to San Francisco, by the transmission of telegraphic time signals through the submarine cable lately completed by the Pacific Commercial Cable Company between California and the Island of Oahu. The important national interests in the Territory of Alaska, with the supervision and development of which this organization is charged, were not neglected during the period covered by the Report; for, besides taking a weighty part in the preparation of the data that were submitted to the Tribunal which made the Alaskan boundary award, four well-equipped surveying steamers were employed in astronomical, hydrographic, and topographic operations in Bering Sea, and in Icy Strait, Davidson Inlet, Controller Bay, and Prince William Sound.

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GEOGRAPHICAL RECORD.

AMERICA.

VALPARAISO'S HARBOUR TO BE RENDERED SAFE.—*El Puerto de Valparaiso*, just published in Chile, contains the report of the Commission appointed to investigate the plans of Mr. Jacob Kraus, a Dutch engineer whom the Chilian Government had employed to prepare a plan for safeguarding the harbour. Valparaiso is the leading Pacific port of South America; but its splendid deep-water bay has the disadvantage of opening wide to the sea, so that hurricanes and great storms enter it. In the past eighty years 378 vessels in the harbour were destroyed by storm. A year ago the passenger ship *Arequipa* foundered in the bay, with 100 souls. Mr. Kraus reported that on account of the depth of water it was impracticable to build a sea-wall across the wide entrance to the bay. His improvement contemplates the construction of basins and sea-walls along a part of the water front of sufficient capacity to accommodate all the shipping. The Commission examined the topographic, geological, technical, financial, and other conditions of the work, and, with some minor modifications, the plans of Mr. Kraus have been adopted. The cost of the improvements, including a dry dock, is computed at $10,950,000. It is estimated that the tax on tonnage, together with the rentals of yards, sheds, and warehouses, will yield an income of $793,800, and that the improvements will